

# **EBM-B100**

**EMW Wireless Ethernet Bridge**



**User Manual**



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## 1. Product Overview

### 1.1 Introduction

Using binary code division multiple access (CDMA), the Wireless Ethernet Bridge can send multi-channel code division multiple access CDMA signals through the existing time division multiple access radio frequency (TDMA RF). Based on this, EMW developed a small, low-power system using a 2.4 GHz industrial science medical (ISM) band.

Binary CDMA wireless communication enables stable, high-speed communication with low interference, excellent security, and quality of service (QoS).

This product is designed for Internet Protocol (IP) networks only in order to enable the wireless transmission and reception of IP camera video, audio, and data. It is used for the wireless connection of sections in a network that are difficult to connect. An integrated wireless bridge model with an embedded 2.4 GHz directional antenna and a non-directional antenna model can also be supplied. Power is provided through USB or an external DC source. For wireless communication, 10/100 Mbps Ethernet is used.

### 1.2 Applications

#### 1) Disaster monitoring

- Danger alarms for typhoons, heavy snow, heavy rain, river flooding, water quality/soil contamination, etc.

#### 2) Internal environment monitoring of residences

- Intrusion monitoring
- Monitoring of children
- Home monitoring such as crime prevention/fire monitoring

#### 3) Management of facilities

- Automatic management
- Remote control
- Fire detection
- Crime prevention and danger alarms

**4) Real-time multimedia transmission**

- Real-time transmission of video/audio, user-created contents (UCCs), and data

**5) Crime prevention monitoring**

- Residential area monitoring and crime prevention systems
- Prevention of theft and damage, crime prevention/perimeter monitoring

**6) Sensor networking**

- Sensor node information collection
- Multi wireless transmission
- Data sharing
- Internal voice calling

**7) Construction site management**

- Identification of construction progress and prevention of accidents
- Access control
- Installation of CCTVs in tower cranes

→ This is a solution to the camera re-installation and time problems that occur as the crane rises.

- Connection between management offices and construction sites

**8) Temporary wireless network**

This device can be used in sites such as construction sites and temporary buildings that require stable communication and an Internet network at low cost.

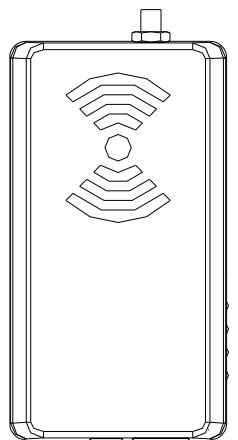
**9) Thanks to the compact size and low power consumption, it can be applied to smart grid applications, high-speed WPAN networking applications, wireless home network applications, wireless digital video recording, and security applications****10) Provides a wireless dam water level management system where a wireless LAN is difficult to install****11) Forest fire monitoring where wiring is impossible****12) Wireless security system for national borders and base camps****13) CCTV for protection of power generation facilities****14) CCTV for wireless traffic monitoring systems/emergency disaster monitoring on the road**

- Transmission of accident and disaster situations in unspecified locations on the road

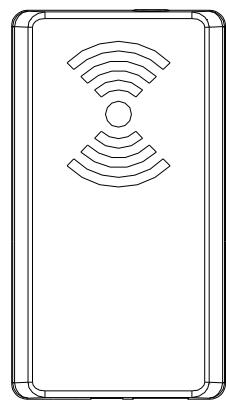
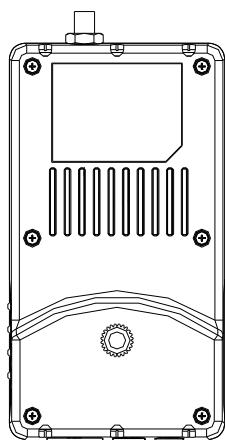
- Transmission of video data during movement → Provision of road traffic information
- HD video transmission → Use of existing wired highway networks

## 2. Components

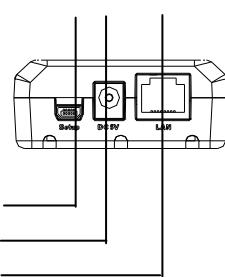
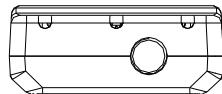
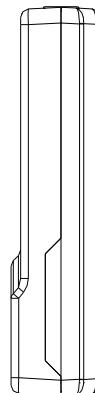
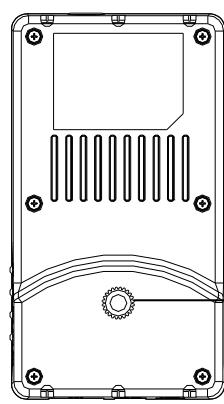
### 2.1 Main Body



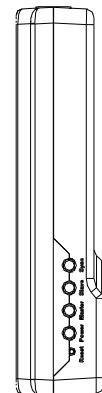
\* Monopole Type



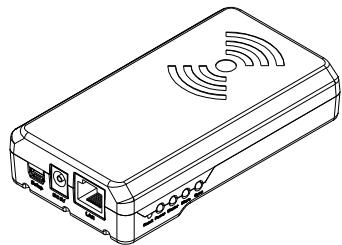
\* Patch Type



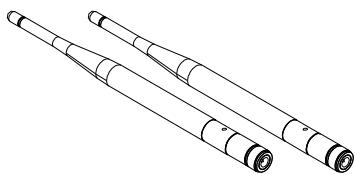
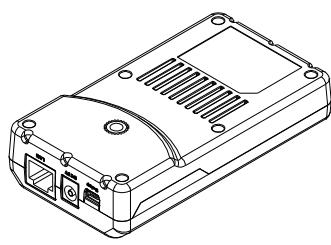
USB Setup  
DC 5V  
RJ-45 LAN



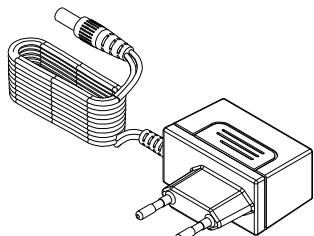
## 2.2 Accessories



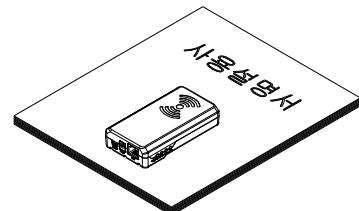
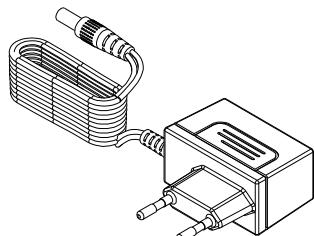
Main Body



\* Monopole Antenna



5V Adapter



User Manual

No.	Item Name	Qty	Remark
1	Main Body	2	
2	Monopole Antenna	2	Only applied for monopole antenna type
3	5V Adapter	2	
4	User Manual	1	

\* Note: The patch-type product is not included for the monopole antenna.

### 3. Product Installation

#### 3.1 Device Installation

##### 3.1.1 Conditions for Monopole Antenna Installation

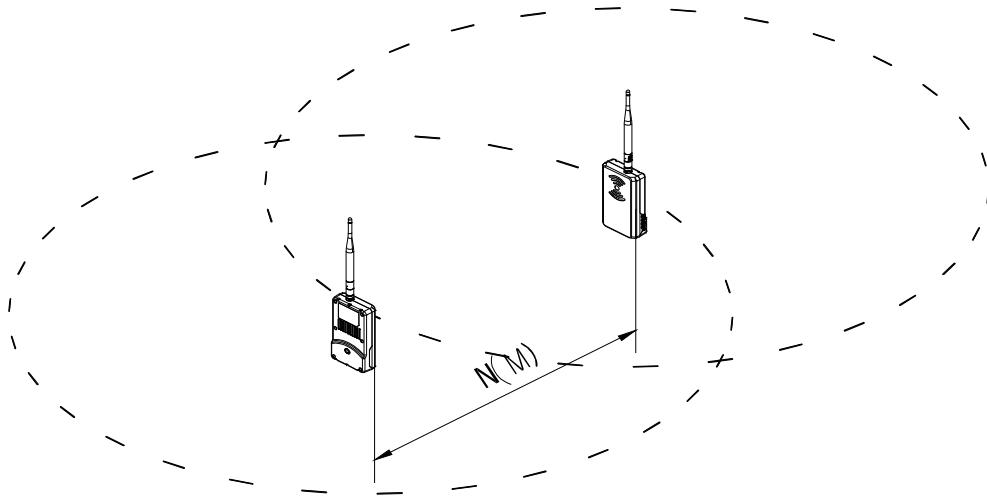


Figure 1-1. Monopole Type

- As the monopole antenna is non-directional, consider the distance between the two products before others.
- The distance "N" may vary by the antenna characteristics and the RF output power. See Chapter 6, "Dimensions and Specifications."

\* Note: The distance "N" is based on the measurement in an open site with no obstacles.

##### 3.1.2 Conditions for Patch-Type Antenna Installation

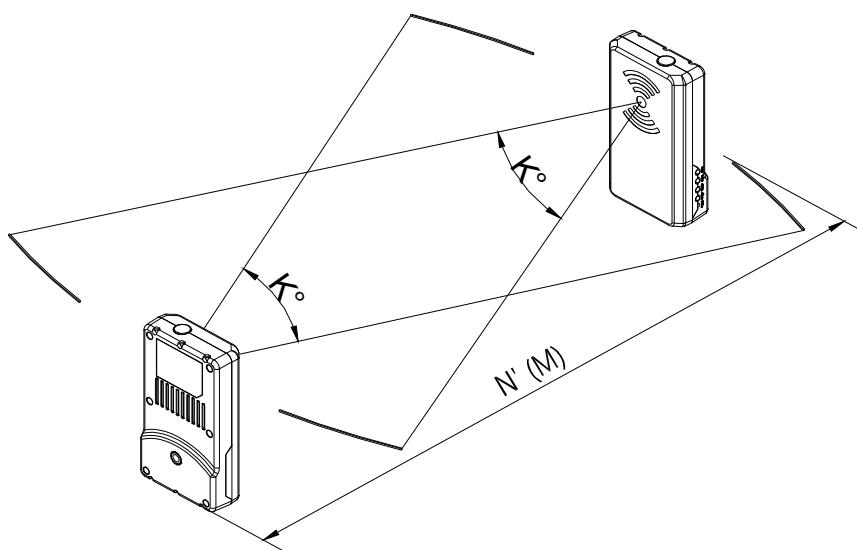


Figure 1-2. Patch-Type Antenna

- As the patch-type antenna is directional, it has a beam width property. Therefore, coverage must be considered in addition to the distance between two products.

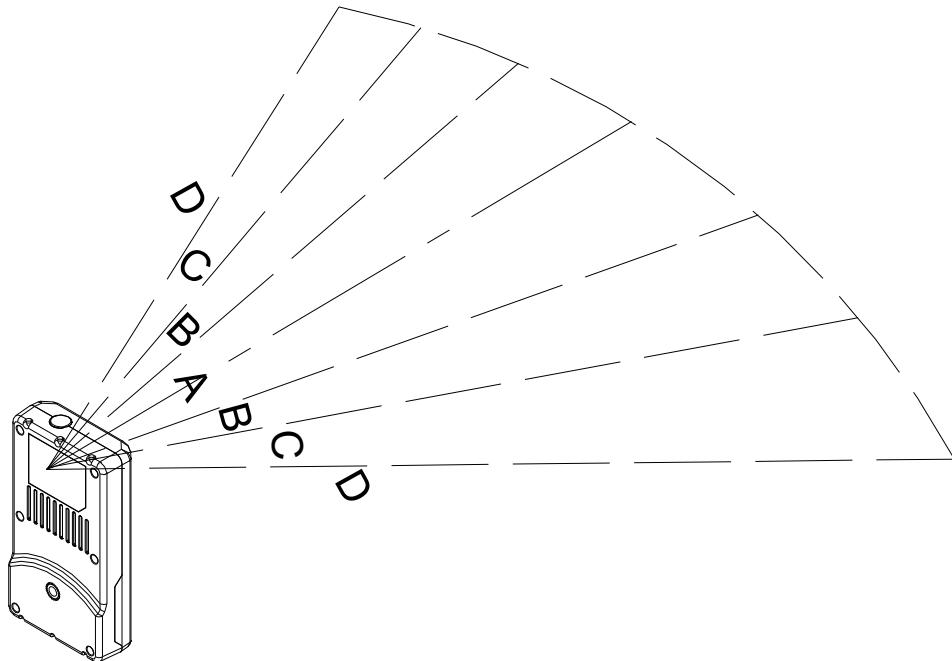


Figure 1-3. Patch-Type Beam Range

- The signal sensitivity for the coverage of the beam width is given in the following table. The best sensitivity can be achieved at the center-to-center angle (recommended at the time of installation).

Area	A	B	C	D
*Angle	-15~15	-30~-15/15~30	-45~-30/30~45	-45 or lower/45 or higher
Sensitivity	Best	Good	Normal	Bad

\* Note: These data are based on a beam width of 90°.

- The distance "N" and coverage "K" may vary by the antenna characteristics and the RF output power. See Chapter 6, "Dimensions and Specifications."

\* Note: The distance "N" and angle "K" are based on the measurement in an open site with no obstacles.

### 3.1.3 Installation Examples

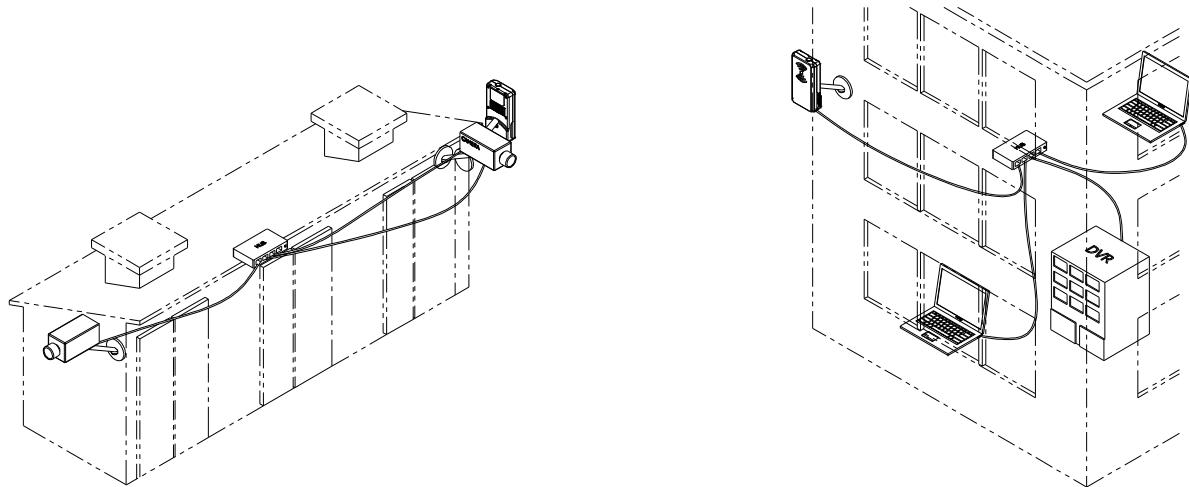


Figure 2-1. Examples of Installation in an Urban Area

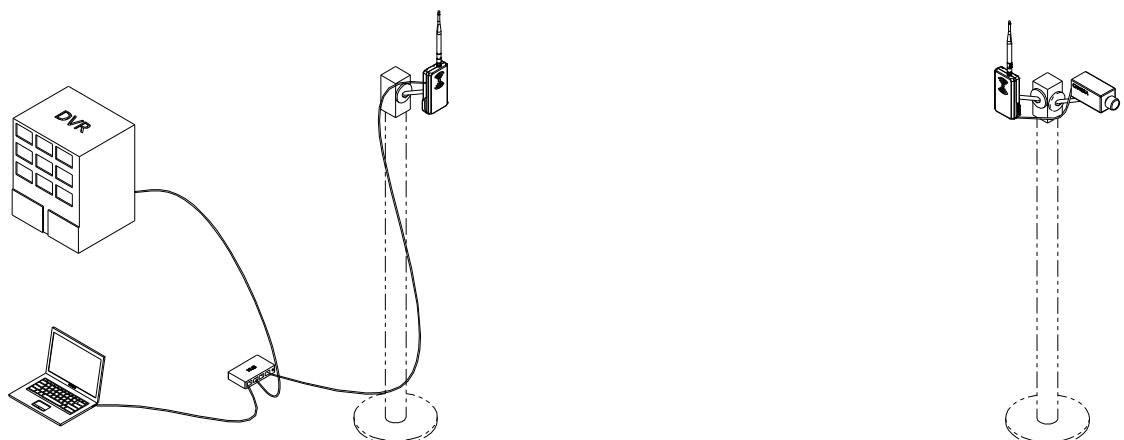


Figure 2-2. Examples of Installation in an Open Area

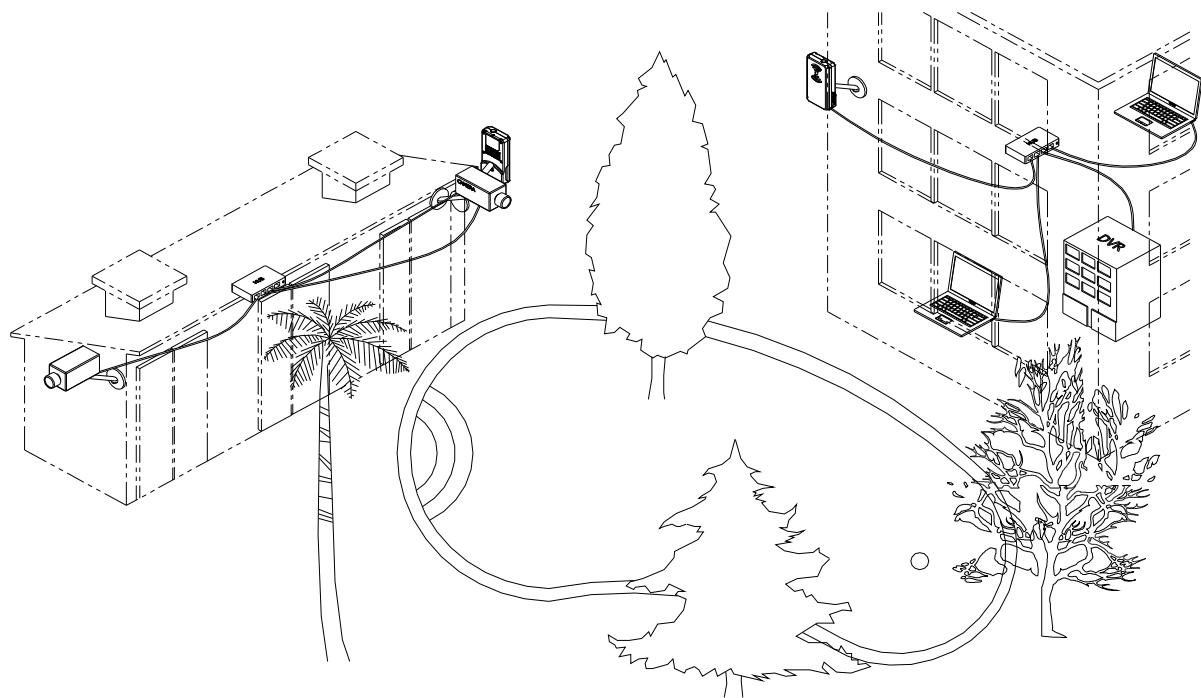


Figure 2-3. Examples of Bad Installation (Interference by Trees)

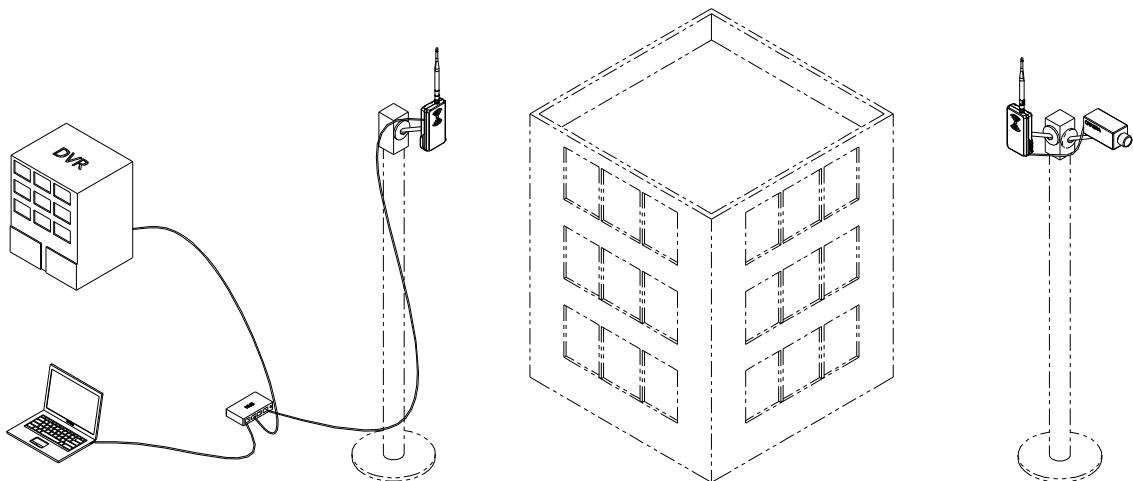


Figure 2-4. Examples of Bad Installation (Interference by Buildings)

### 3.2 Product Connection Diagram

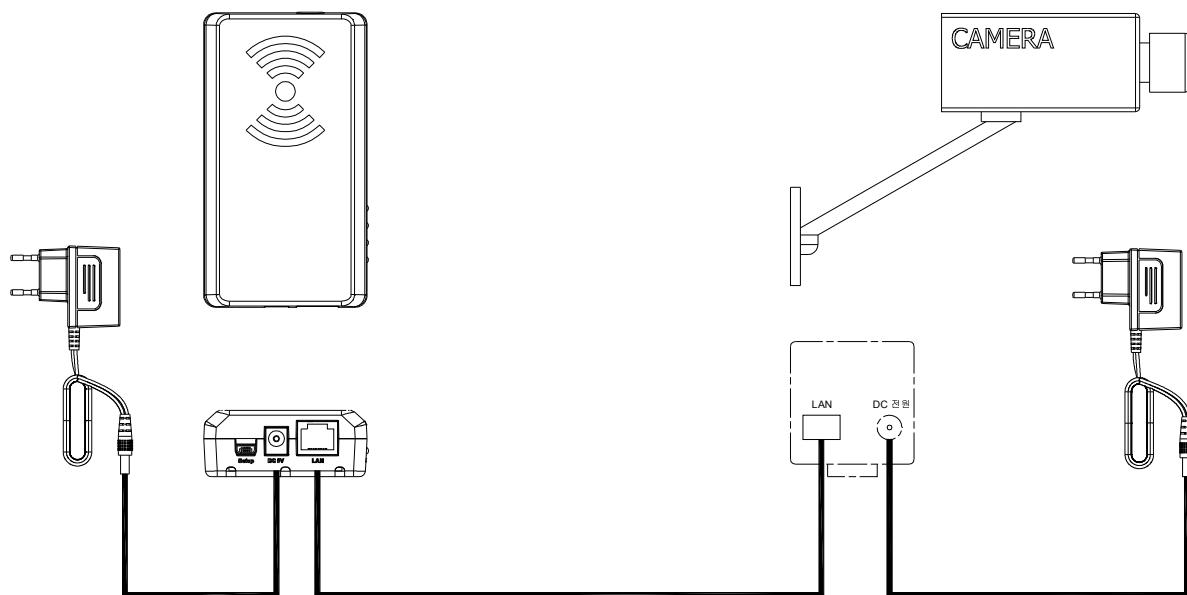


Figure 3-1. Client-side (CCTV) Connection Diagram

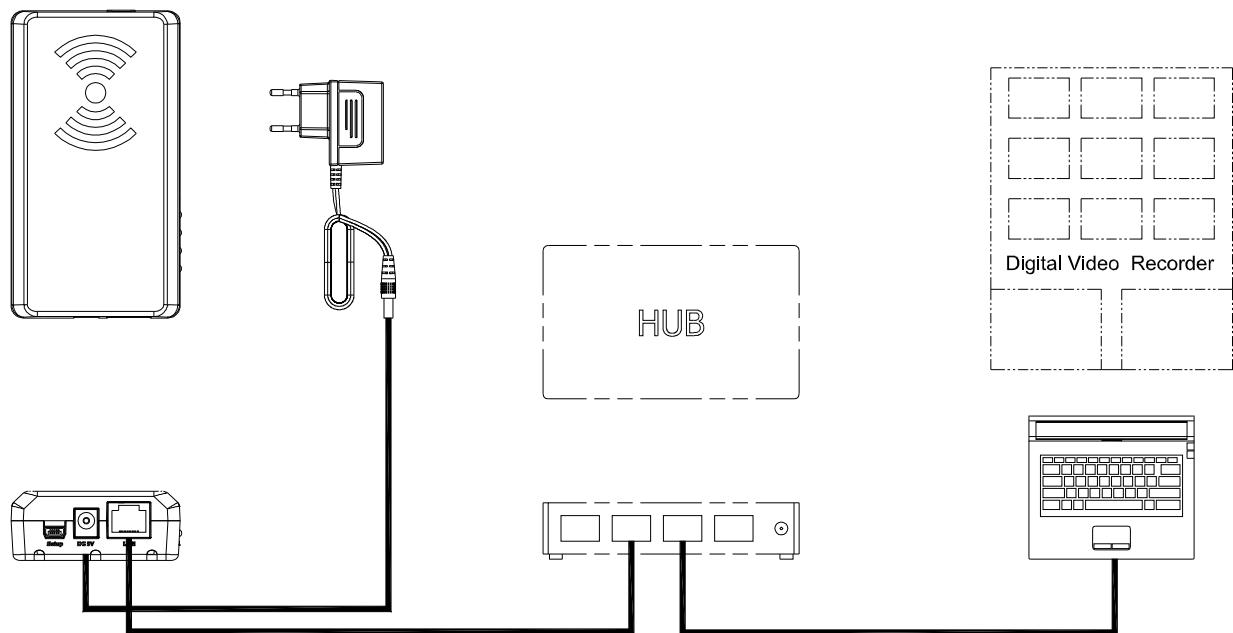


Figure 3-2. Host-side (DVR, PC) Connection Diagram

### 3.3 Setting Program Installation

#### 3.3.1 Conditions for Installation

##### - PC Specifications

	Recommendation	Minimum
OS	Windows XP or higher	Windows XP
CPU	Core 1.6 GHz or higher	Core 1.0 GHz
RAM	1 GB or more	512 MB
HDD (Free Space)	100 MB or more	10 MB

#### 3.3.2 Method of Installation

- .Net Framework version 3.5 or higher must be installed to run the dedicated GUI program.

\* It does not need to be installed in Windows 7 OS or higher because it is included by default.

- After running the execution file, it is necessary to agree to the license and click the Install button.

- Then, the file can be downloaded and the application installed.

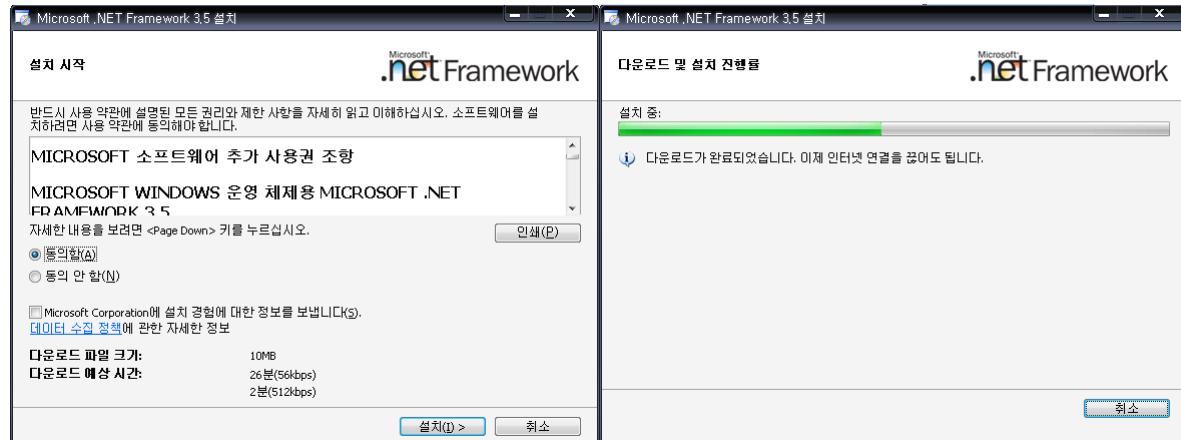


Figure 3-3. .Net Framework Setup Screen

#### 3.3.3 Running the Setting Program

- Once the .Net Framework is installed successfully, the setup program can be run directly.

## 4. Product Features

### 4.1 Basic Operations

#### 4.1.1 Setting a 1:1 Connection

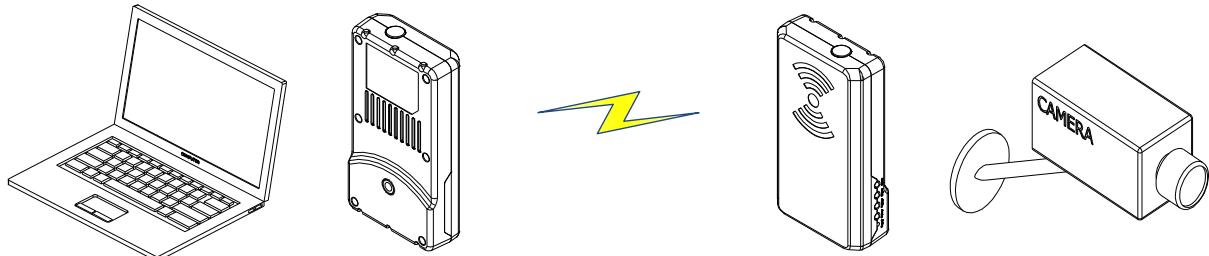


Figure 4-1. Setting a 1:1 Connection

\* The maximum transmission rate for this setting is 10 Mbps based on the QPSK modulation method.

#### 4.1.2 Setting 1:N Connections (Using a Hub)

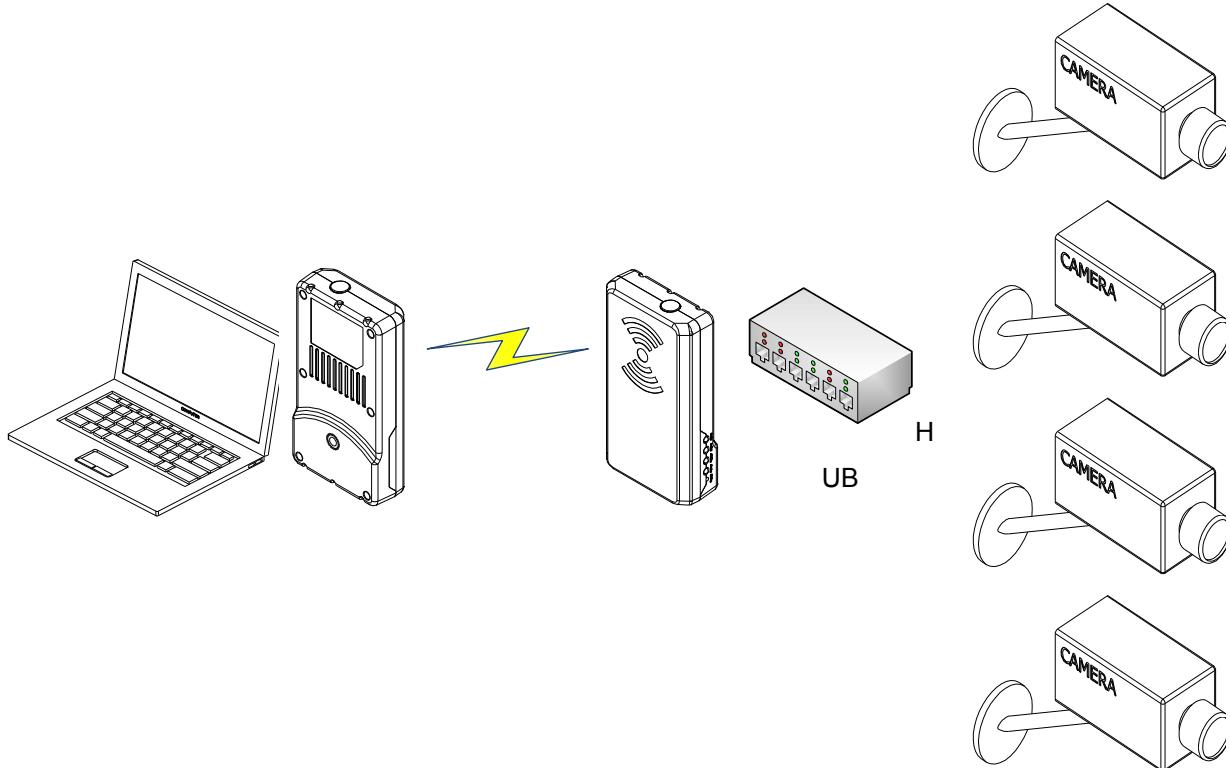


Figure 4-2. Setting 1:N Connections with a Hub

\* The maximum transmission rate for each camera at this setting is 10 Mbps/camera node count based on the QPSK modulation method.

Examples: Two-camera connection:  $10/2 = 5$  Mbps

Four-camera connection:  $10/4 = 2.5$  Mbps

#### 4.1.3 Setting a 1:N Connection

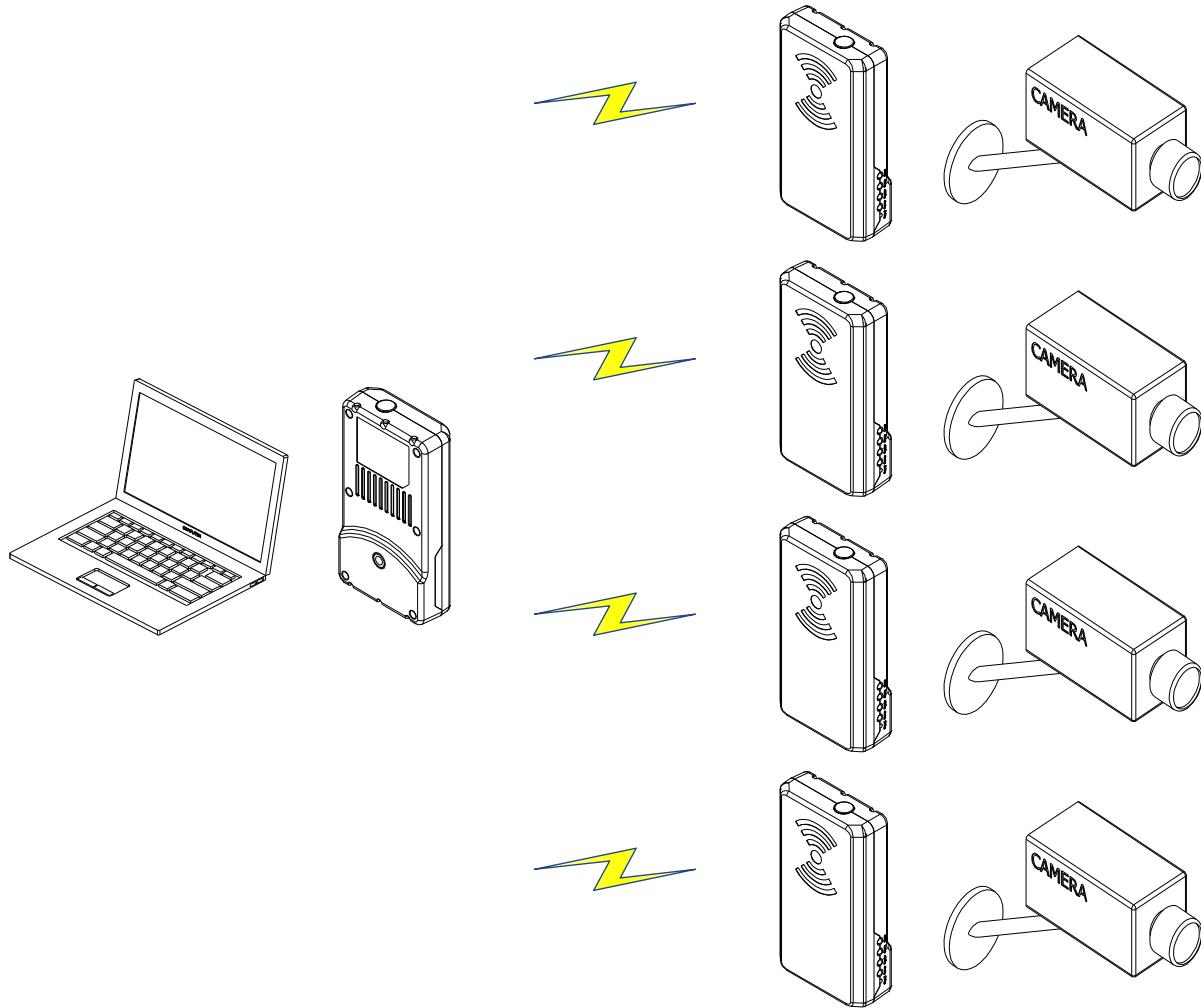


Figure 4-3. Setting a 1:N Connection

\* The maximum transmission rate for each camera in this setting is 10 Mbps/total number of stations (Ethernet Bridges) based on the QPSK modulation method. For example, when two cameras are connected, there are three stations (1 master + 2 slaves),  $10/3 = 3$  Mbps

When four cameras are connected, there are five stations (1 master + 4 slaves),  $10/5 = 2$  Mbps

\* The maximum number of slaves that can be connected to one master is 250.

#### 4.1.4 LED State Display

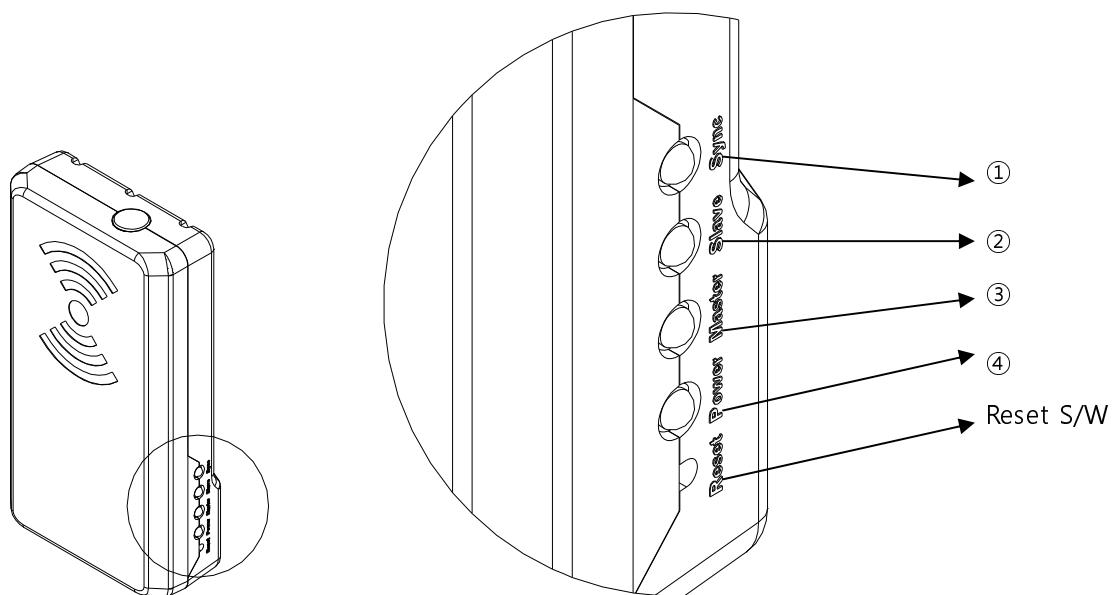


Figure 4-4. LEDs

No.	LED	Description
1	Sync	The master and slaves have been joined normally and the network configuration has been completed.
2	Slave	The device works as slave.
3	Master	The device works as master.
4	Power	Power connection.

#### 4.1.5 Reset S/W

- Used to reset hardware and re-boot the device.
- Used to update the firmware through the USB port (dedicated GUI is needed)

\* Note: The device settings can be initialized only by the setup program, and not the Reset button (see 4.2.5, “Factory Reset”).

## 4.2 Function Settings

### 4.2.1 Connection Settings

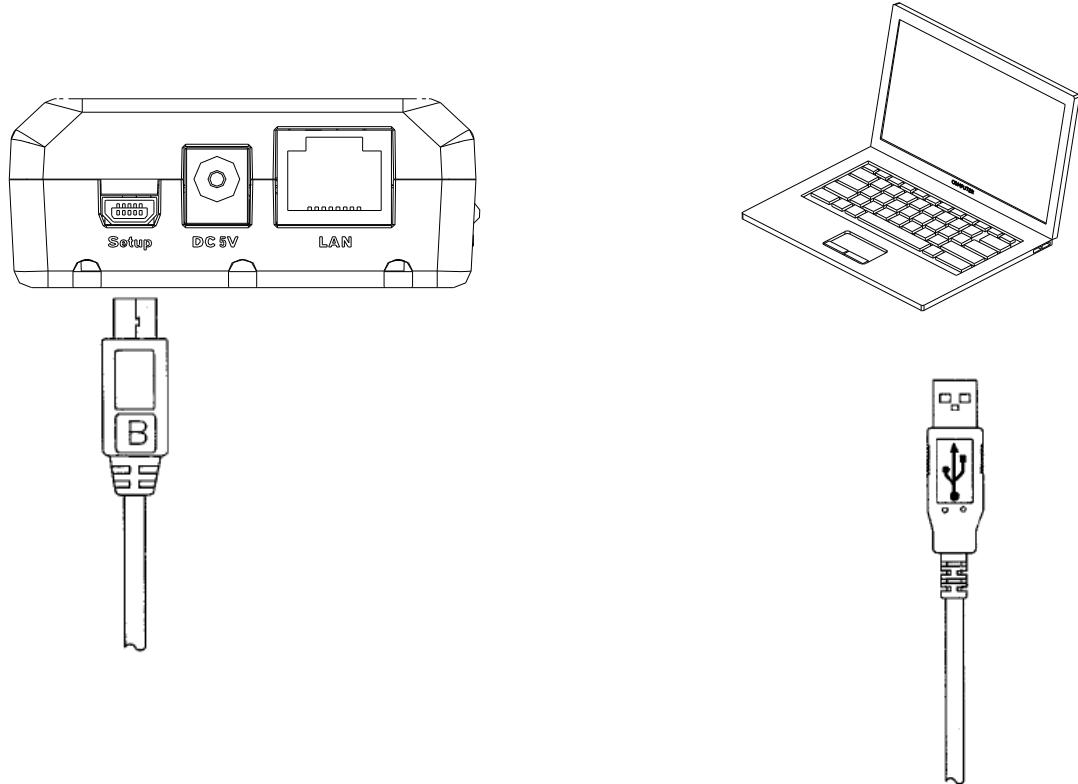


Figure 4-5. Cable Connections for Function Setting

- Connect the PC with the device for setting through a USB cable. No separate DC power source is needed, as power is supplied through the USB.

\* Cable size: Mini USB 5P to USB A 4P Male

- If the Windows driver for USB is not installed, it must be downloaded from the following website before starting installation.

\* Download site: <http://www.ftdichip.com/Drivers/VCP.htm>

#### 4.2.2 Program Running

- When the EthernetBridge\_UI.exe file is run, the following main screen appears.

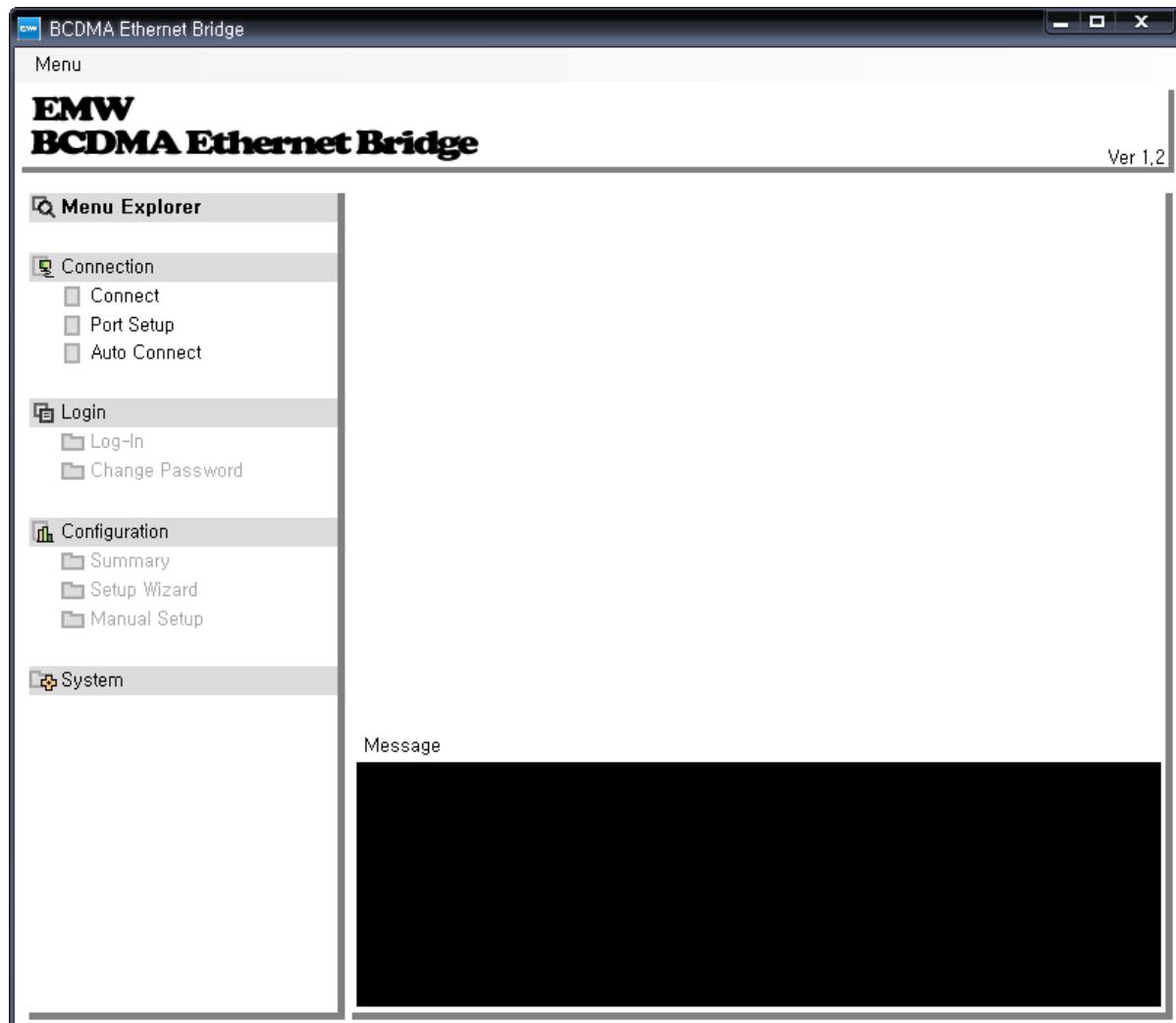


Figure 4-6. Main Screen of the Settings Program

#### 4.2.3 Connection Settings

- Connection: The PC should be connected in accordance with the current settings, if possible.
- Port Setup: A connection setting menu is available for the items listed below.

	COM Port	Parity	Baud Rate	Stop Bit	Data Bits	Hand Shake (Flow Control)
Item	User side	None	115200	1	8	None

\* Only the COM port can be changed in line with user settings. The rest must be set as above.

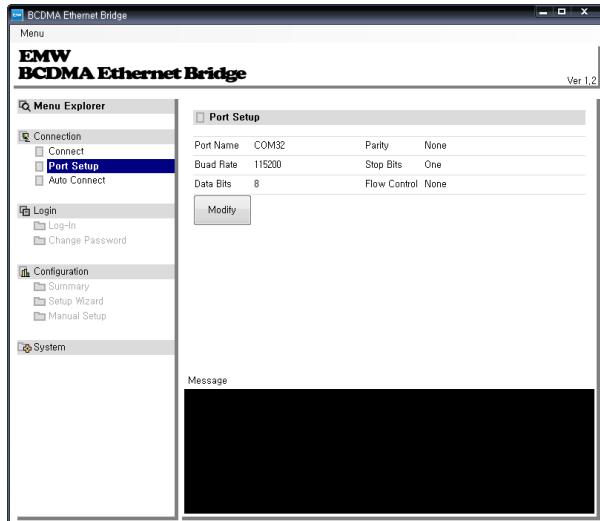


Figure 4-7. COM Port Settings Check

- Clicking the Modify button allows setting changes to be made in the following window.



Figure 4-8. Changing COM Port Settings

- Auto Connect: If unfamiliar with the virtual COM port, it may be possible to use an auto connection. All the available ports are scanned and a valid port is connected.
- If the connection is successful, the following message appears.

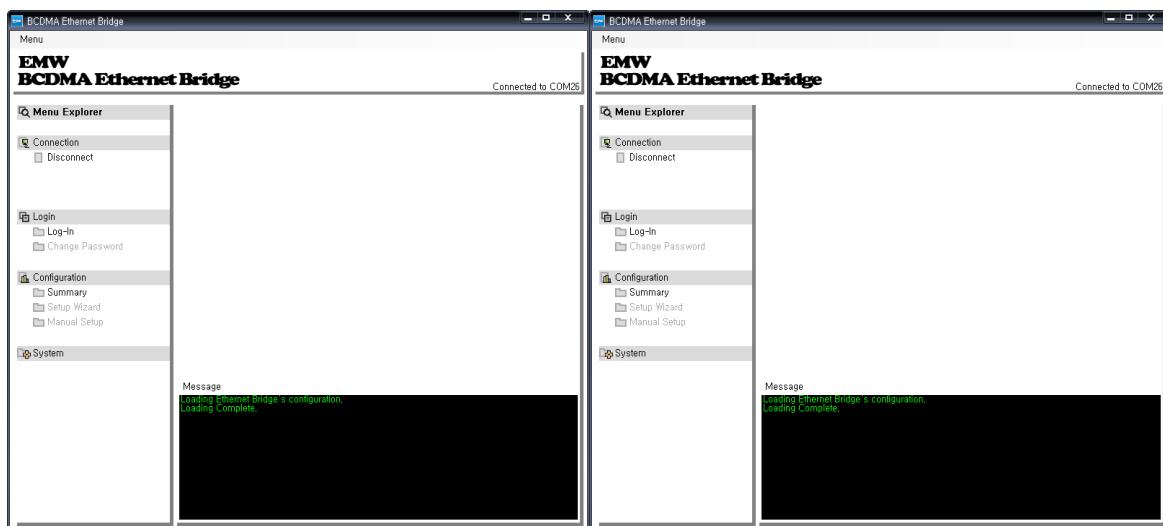


Figure 4-9. Auto Connect Port Scan

Figure 4-10. Connection Successful

#### 4.2.4 Login

- Privilege Setting (Log-In): To change the settings, client privilege must be obtained by logging in.

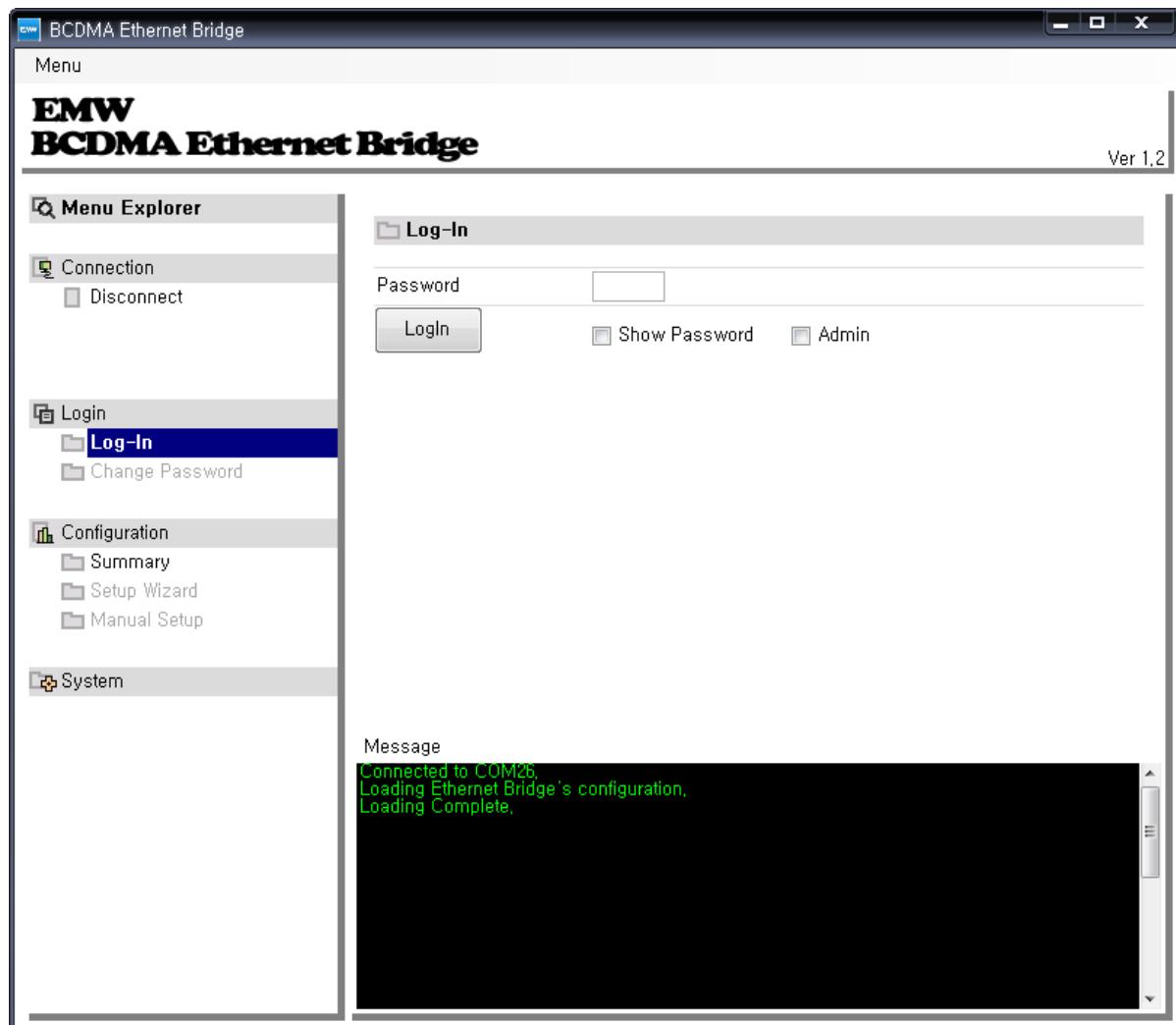


Figure 4-11. Log-in

\* The password is set to “0000” at the time of shipment from the factory.

- Super User privilege can be obtained by selecting the “Admin” Check Box, which allows access to all hidden menus.

\* The dealer can provide the Admin Password.

- Change Password: With this function, the login password can be changed.

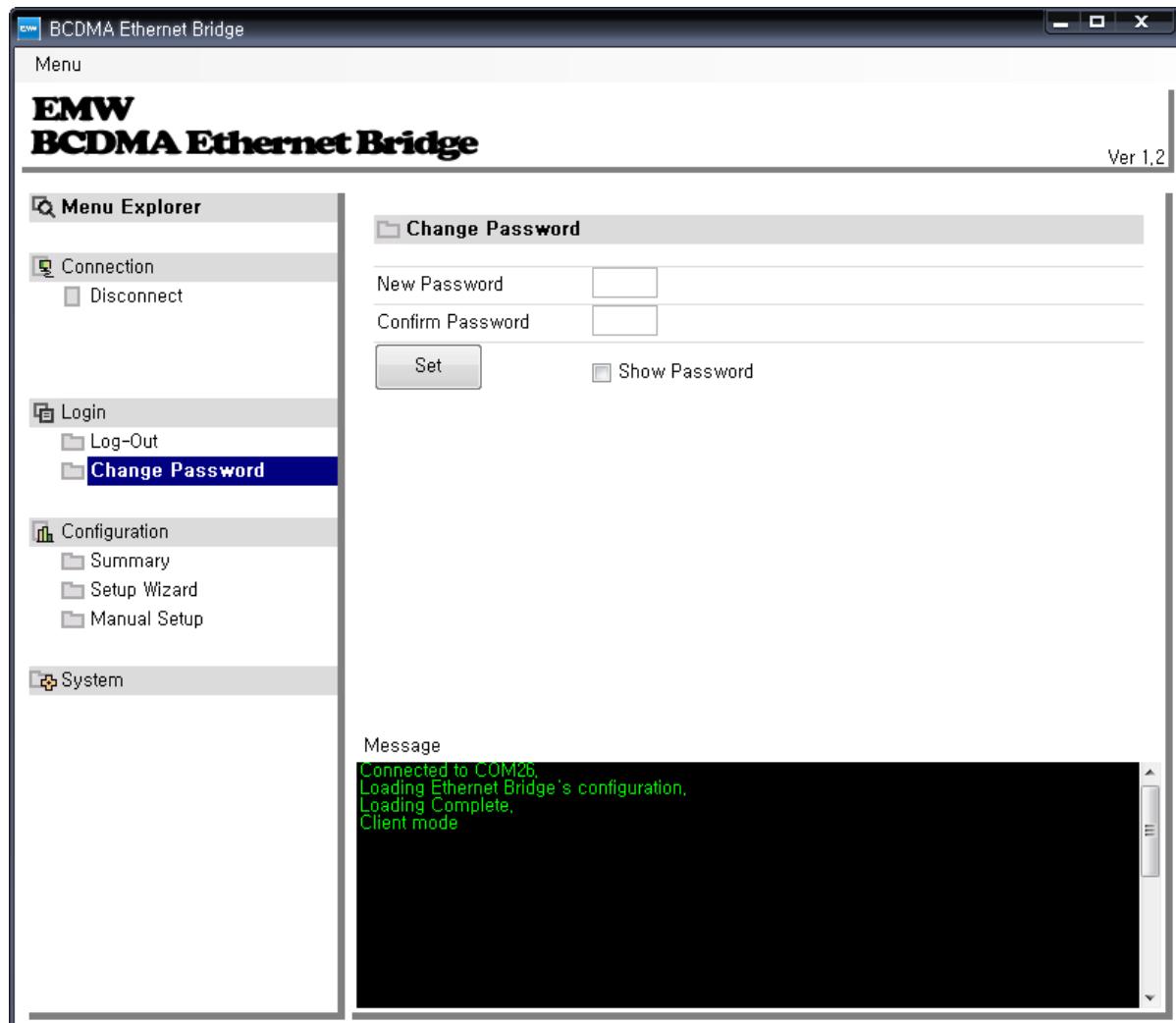


Figure 4-12. Change Password

- \* If the password is forgotten, it can be set to “0000,” which is the factory shipment state, through the Factory Reset menu.
- \* The password must be four digits long, ranging from 0 to 9. Other keys are not inputted.

#### 4.2.5 Configuration

- Summary: Check the content of the current settings.

\* This function only shows the settings and it is not necessary to log in.

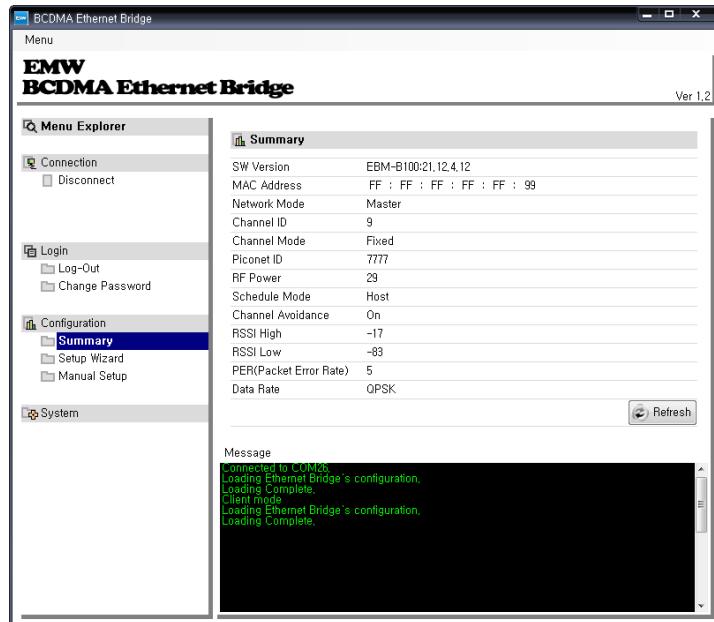


Figure 4-13. Summary

- Setup Wizard: The device can be set up quickly through this Wizard without manual setup.

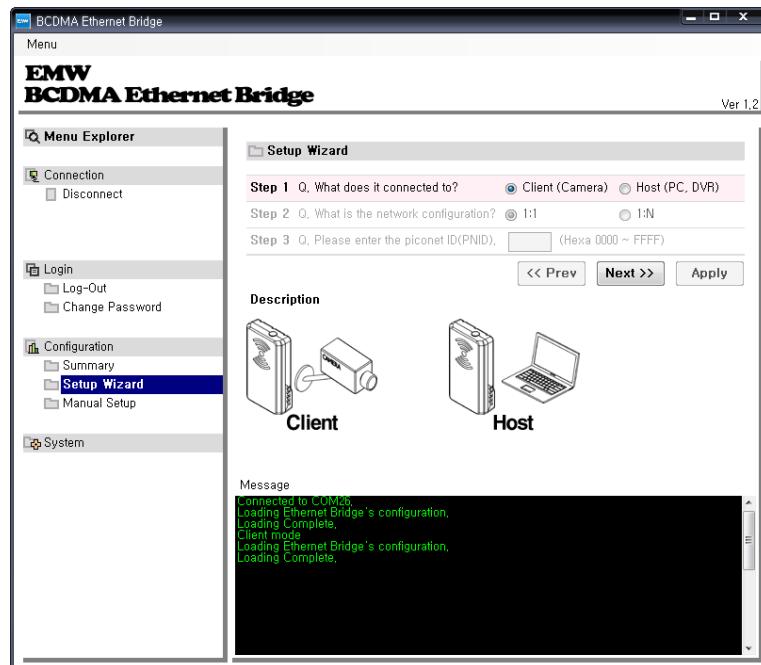


Figure 4-14. Setup Wizard

- Manual Setup: This is an advanced feature used to manually set each item. Beginners should not use this feature because it requires expert knowledge about each feature.

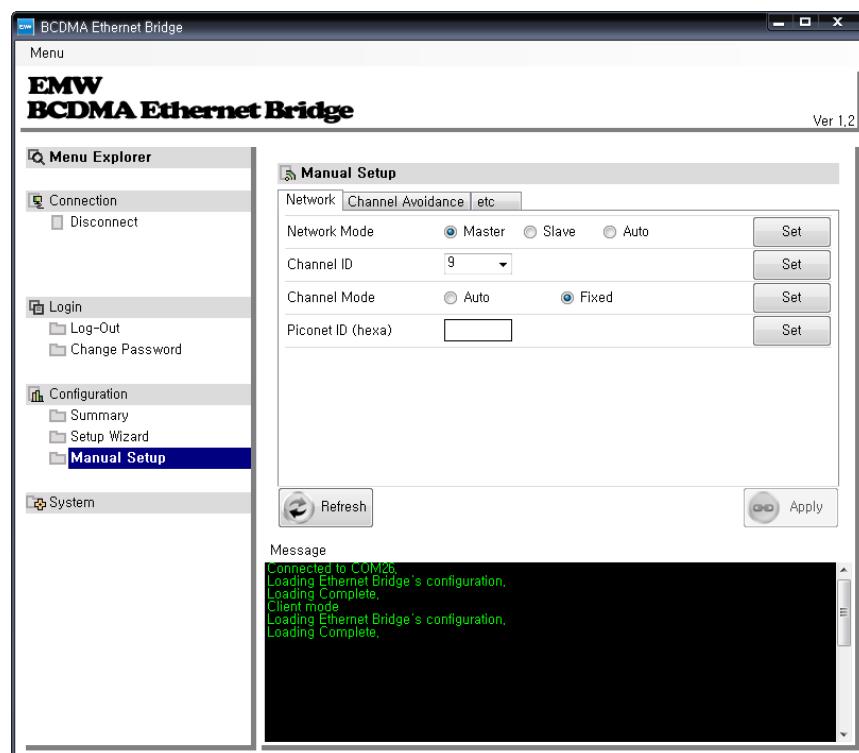


Figure 4-15. Manual Setup (Network)

#### -- Network Mode

- A. Master: Master Mode Fix
- B. Slave: Slave Mode Fix
- C. Auto: Set to Master if there is no Master, and set to Slave if there is a Master.

#### -- Channel ID: A channel must be selected between 0 and 4 (2.4 GHz ISM Band)

CH	0	1	2	3	4
Freq. (GHz)	2.403– 2.417	2.419– 2.433	2.435– 2.449	2.451– 2.465	2.467– 2.481

\* This is valid only if the Channel Mode is Fixed. It is automatically selected if the Channel Mode is Auto.

-- Channel Mode

- A. Auto: The whole available band is scanned and a channel with excellent quality is automatically selected.
- B. Fixed: Assigned to the channel defined in Channel ID by force.

-- Piconet ID: When two different Masters exist in a network, the network is configured to that with the same PNID.

\* If this is changed arbitrarily, the network may not be configured.

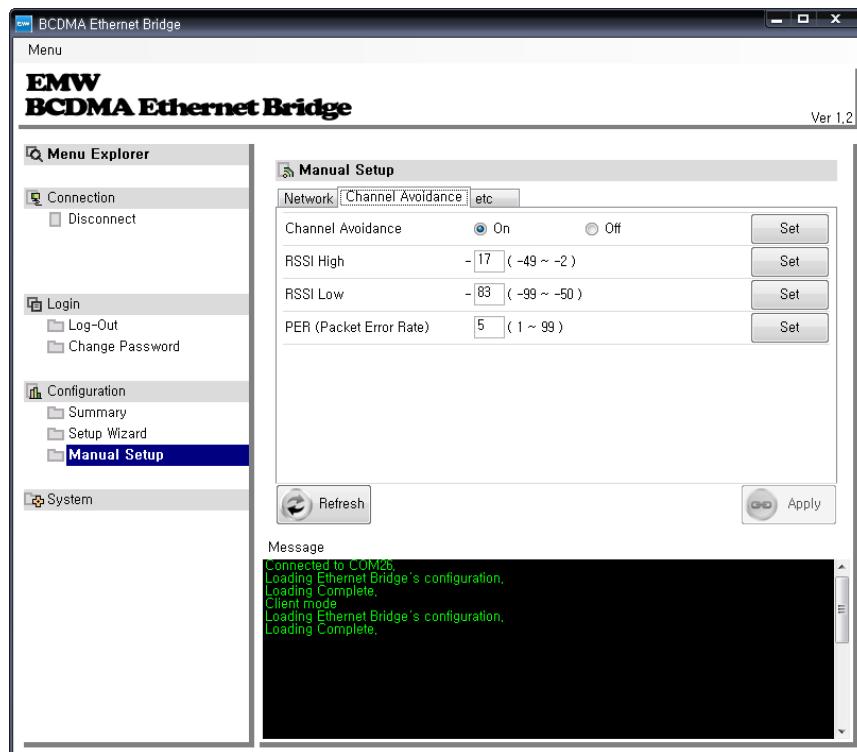


Figure 4-16. Manual Setup (Channel Avoidance)

- Channel Avoidance: Select whether or not to reconfigure the network to another channel with a better quality through Auto Scan If the quality of the current channel is poor due to physical interference.
- RSSI High: The maximum sensitivity for wireless reception is set and Channel Avoidance is activated if the value is greater than this level.
- RSSI Low: The minimum sensitivity for wireless reception is set and Channel Avoidance is activated if the value is lower than this level.
- PER: The allowed value for Packet Error Rate is set and Channel Avoidance is activated if the value is greater than this level.

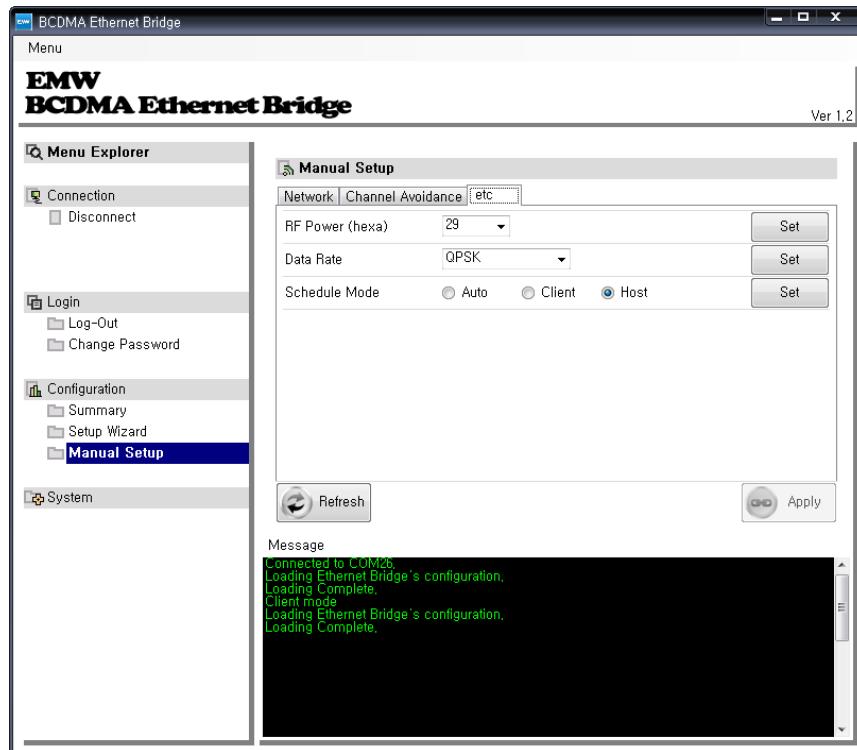


Figure 4-17. Manual Setup (Other)

-- RF Power: This item adjusts RF output power. The output gain is shown in the following table.

RF Power	0x10	0x18	0x20	0x24	0x28	0x2C	0x30	0x34	0x38	0x3F
Tx Gain [dBm]	0.8	4.0	6.7	8.0	9.6	11.1	12.6	14.2	15.6	17.5

\* An appropriate value is used depending on the installation environment and distance.

-- Data Rate: The modulation method for data transmission can be changed. In the case of Binary 3 and 4, the rate decreases, but interference decreases and transmission distance increases.

-- Schedule Mode: In the case of a 1:1 setting, to achieve the maximum data transfer, the camera is set as the client and the PC (DVR) as host. In the case of a 1:N setting, Auto is set for automatic assignment according to the value of N.

\* Recommendation: The 1:1 and 1:N Hub settings are the Host and Client. The 1:N setting is Auto.

#### 4.2.5 System Settings

- F/W Upgrade: The firmware can be updated to the latest version in the event of revisions.

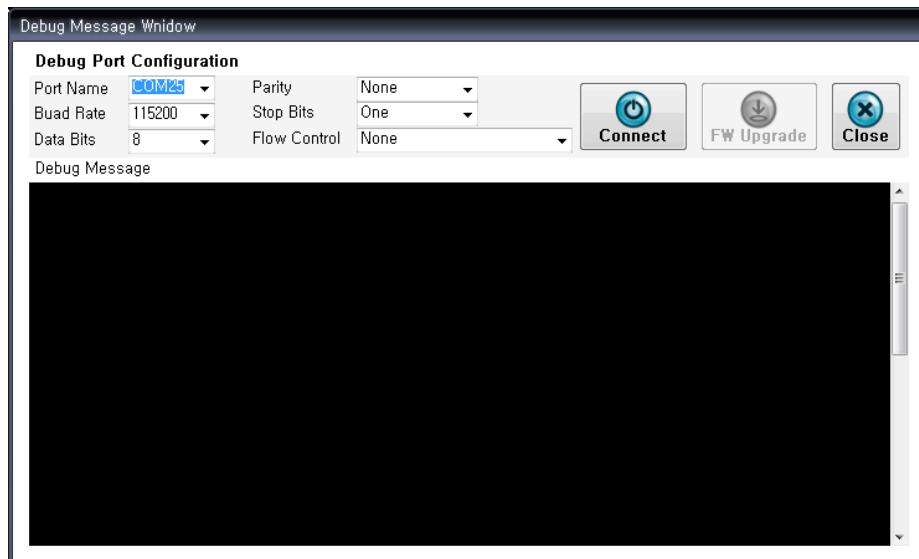


Figure 4-18. Debug Message Window for Firmware Update

- A. Set to Debug Port and Click the Connect Button.
- B. When it is connected normally, the FW Update button is enabled. Click this button, select a file to update, and click OK.
- C. When the following window appears, press the Reset button to carry out the update.
- D. Once the update is completed, the system is rebooted and the device is automatically connected.

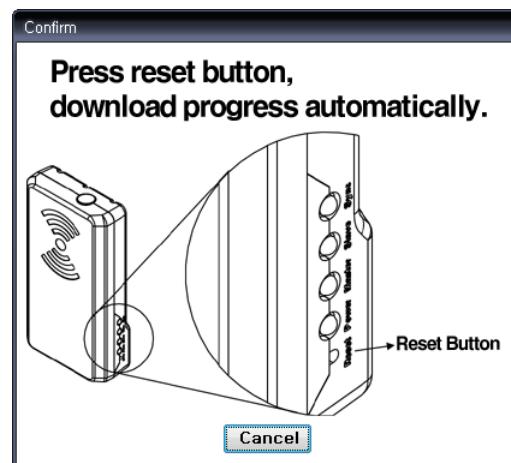


Figure 4-19. Firmware Update Guide Window

- Factory Reset: All the settings are reset to the initial factory state.

\* Note: The factory reset values of each item are shown below.

Item	Network Mode	Channel ID	Channel Mode	Piconet ID	RF Power	Schedule Mode	Channel Avoidance	RSSI High	RSSI Low	PER
Value	Auto	0	Auto	0x0000	0x28	Auto	On	-17	-83	5

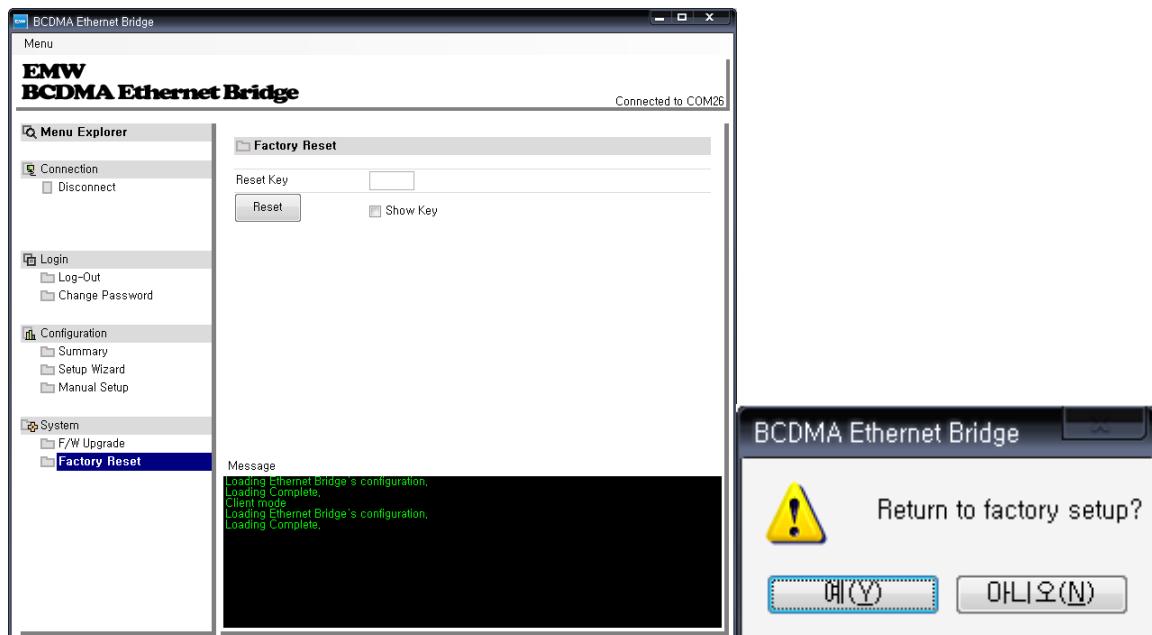


Figure 4-20. Factory Reset

## 5. Cautions

- ① Install the power adapter and the product out of the reach of children  
(prohibit children from touching them).
- ② Do not install the product in bathrooms, sinks, or other wet places.
- ③ Secure a place with good external signals before installation.  
=> Check with a terminal (Debug screen).
- ④ Determine where and how to install the product.
- ⑤ Check the installed direction of the product: The antenna shape must be directed to the serviced area.
- ⑥ Make sure that there are no obstacles (people, metal plates, walls, pillars, etc.) within 1 m of the front of the product.
- ⑦ Check the support so that the product is fixed firmly.
- ⑧ Connect the DC power jack to the bottom of the product.
- ⑨ Wait for about 5 seconds after connecting the AC adapter jack to 220V.
- ⑩ When the power and status LEDs at the top of the product turn on, check for normal operation.

## 6. Dimensions and Specifications

<b>EBM-B100</b>	
Product Description	Ethernet Bridge
Binary CDMA Standard	ISO/IEC 24771 Koinonia Binary CDMA Compliant
Interface	5 Pin Mini USB (2-Ch Virtual Com Port) / DC Jack (5V) / RJ-45 (Ethernet)
Dimension	120.0 X 66.0 X 27.0 mm
Weight	100 g
<b>Operating Conditions</b>	
Temperature	Operating: -20-70 °C
Relative Humidity	< 60%(storage) < 85%(operation)
<b>Electrical Specifications</b>	
Frequency Range	ISM-Band (2400–2483.5 MHz)
Channel Bandwidth	16 MHz / 5 CH
Modulation	Binary, DQPSK, 16-QAM, 32-QAM, 64-QAM
RF Output Power	10 dBm
Receive Sensitivity	RSSI -60 dBm, SNR 20
Distance Range	400 m–2 Km (PER 1%>, Open Site) <b>* The distance can be increased with a different antenna type</b>
Power Consumption	400 mA–450 mA (Typical)
Input Power Voltage	5.0V
Medium Access Controller & Baseband Processor	44 MHz Embedded AMR7TDMI 1 Kbyte Boot ROM 64 Kbyte Zero-wait SRAM for Code 64 Kbyte Internal SRAM for Data and Buffer 512 Kbyte External SRAM Hardware-Based MAC Access Protocol Management Channel Probing and Dynamic Link Quality Control CCA/Energy Level/RSSI Detection